

# A NEW SPECIES OF THE GORGONACEAN GENUS *BEBRYCE* (COELENTERATA: OCTOCORALLIA) FROM PAPUA-NEW GUINEA

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## ABSTRACT

A new species of the gorgonacean genus *Bebryce* from Papua-New Guinea is described as *B. cactus*, new species, and illustrated by scanning electron micrography.

During the course of investigating the biology of comatulid crinoids in the vicinity of Madang, Papua-New Guinea, Dr. Charles G. Messing of Nova University, Dania, Florida, obtained two specimens of a species of *Bebryce* unlike any heretofore recorded. This species reveals the need for a reevaluation of the classification of the related genera *Heterogorgia* Verrill, 1869, *Lytrea* Bayer, 1981, *Nicaule* Bayer, 1981, and *Pseudobebryce* Kükenthal, 1919.

## Genus *Bebryce* Philippi, 1841

*Bebryce* Philippi, 1841:9; 1842:35, pl. 1, fig. 1.—Milne Edwards and Haime, 1857:187.—Kölliker, 1865:137.—Gray, 1869:246; 1870:50.—von Koch, 1887:54.—Studer [ & Wright], 1887:57.—Wright and Studer, 1889:LV.—Studer, 1889:10.—Whitelegge, 1897:314.—Hentschel, 1903:649.—Hickson, 1905:813.—Thomson and Henderson, 1905:294.—Thomson, 1905:175.—Thomson and Simpson, 1909:222.—Thomson and Russell, 1910:150.—Nutting, 1910:47; 1912:87.—Kükenthal, 1919:293, 759, 841.—Aurivillius, 1931:189.—Deichmann, 1936:124.—Bayer, 1956:203; 1961:88, 90 (in key only); 1981:925 (in key only).

*Pseudobebryce* Kükenthal 1919:841; 1924:205 (type species *Bebryce philippii* Studer, by original designation).

*Nicaule* Bayer, 1981:926 (type species, *N. crucifera* Bayer, 1981.)

*Type Species.*—*Bebryce mollis* Philippi, 1841, by monotypy.

*Diagnosis.*—Paramuriceids with outermost layer of coenenchymal sclerites in the form of rosettes that may be cup-shaped or spiny; deeper coenenchyme filled with flat, 3- to 6-rayed stellate plates sometimes in the form of discoidal bodies with several marginal processes, usually with a central boss on the outer surface; no spindles; armature of anthocodiae well developed, with eight points consisting of one or more pairs of more or less curved rods *en chevron* beneath the tentacles above a crown or collaret of several circles of transversely placed bow-shaped spindles, and small, flattened rodlets curved or bent at one end extending along the backs of the tentacles.

*Remarks.*—The sclerites of the outer coenenchyme have been referred to by several ambiguous descriptive expressions including “collar-buttons with beautifully scalloped edges” (Nutting, 1910), “spicules of cotton-reel shape” (Aurivillius, 1931), “spicules . . . resembling the paxillae of starfish” and “Spicula von paxillenähnlicher Form” (Nutting, 1908, and Stiasny, 1942), “rosettes” (Bayer, 1956; Bayer, Grasshoff and Verseveldt, 1983), “sclérites en corbeille” (Carpine and Grasshoff, 1975), and (most commonly) “kleine, kelchförmige Skleriten” (Kükenthal) and cup-shaped sclerites (Deichmann [1936]; Grasshoff [1977]). The term “rosette” is used herein, in accordance with terminology adopted by Bayer, Grasshoff and Verseveldt (1983). The stellate to discoidal sclerites of the deeper coenenchyme have often been termed “scales” since Kölliker’s (1865) introduc-

tion of the term "Schuppen." As these are not "scales" in the sense of the scales of Chrysogorgiidae and Primnoidae, which K  lliker also called "Schuppen," here they will be called crosses, stellate plates, multiradiate plates, or discoidal plates, depending upon their shape.

The genus *Nicaule* Bayer, 1981 (type species *N. crucifera* Bayer, 1981), was established for a *Bebryce*-like species having small, tuberculate double-heads (Bayer, 1981: 929, fig. 48b) derived from 6-radiate capstans in the outer coenenchyme rather than rosettes, and numerous 4-rayed crosses, with occasional tuberculate spindles located around the calicular margins. Supplementary material from western Pacific localities indicates that the double heads are no more than poorly differentiated rosettes; the crosses are identical in form with those present in several *Bebryce* species, and the anthocodial armature is organized in exactly the same arrangement as in all species of *Bebryce* so far known. Consequently, *Nicaule crucifera* can be considered a species of *Bebryce* with poorly differentiated rosettes. The genus *Nicaule* is accordingly reduced to a subjective synonym of *Bebryce* as shown in the synonymy above, and the type species will henceforth be known under the new combination *Bebryce crucifera* (Bayer, 1981).

### *Bebryce cactus* new species

Figures 1–4

*Material Examined.*—Papua-New Guinea: south side of Bagabag Island, 62 km NE of Madang; barrier reef wall at 30–60 feet. Coll. Dr. C. G. Messing, 30 May 1992. Two colonies, USNM 93204 (holotype, SEM 2092, 2093), and USNM 93205 (paratype).

*Diagnosis.*—*Bebryce* with antler-like spiny rosettes filling the outermost layer of coenenchyme, and cruciform to 6-rayed plates concentrated in the deeper layers.

*Description.*—The species is represented by two colonies. The first, here designated as the holotype (Fig. 1), is broadly flabellate, 125 mm wide and 70 mm high, attached by a small, spreading holdfast to a piece of massive sponge. Branching begins immediately above the holdfast and proceeds in an openly pinnate (i.e., "lateral") manner with branches occurring at irregular but wide intervals. The terminal branchlets are curved upward, short, no more than 30 mm long before producing subordinate branches. Eight small actinians are attached directly to the axis where cortex is missing. The branches and terminal branchlets are about 3 mm wide including the low, hemispherical calyces, and occasionally are somewhat clavate terminally, where their width is about 4 mm. The fully developed calyces are about 0.8 mm high and 1.5 mm wide, the developing individuals correspondingly smaller.

The second colony is 150 mm tall and 65 mm wide, attached by a lobed, spreading holdfast to unknown substrate. Branching begins about 7 mm above the base and is roughly in one plane but the colony is somewhat twisted, perhaps through the influence of local currents. The longest undivided terminal branches are about 20 mm long. Several of the terminal branches are more or less decorticated, possibly by abrasion against some obstruction in the immediate surroundings; a specimen of the foraminiferan *Homotrema* is attached to one decorticated branch.

The calices and entire surface of the coenenchyme presents an extraordinarily thorny aspect (Fig. 2) owing to the antler-like, spinous forked projections of the sclerites of the outermost coenenchyme and calicular walls (Figs. 3, 4a), termed "spiny rosettes" (Bayer et al., 1983: 18, fig. 182). These spine-like projections are embedded in a thick coating of translucent mesogloea penetrated by narrow coenenchymal canals. The largest antler-like spiny rosettes (Fig. 4a) are about 0.5

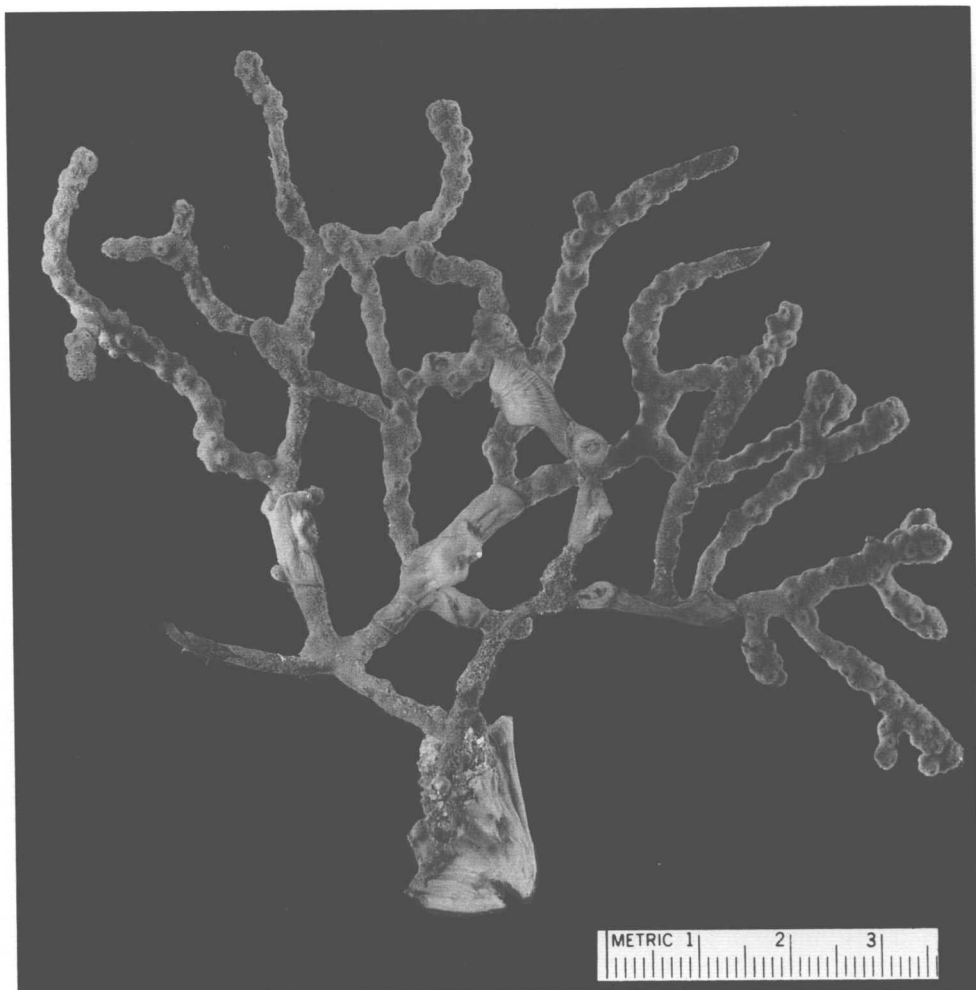


Figure 1. *Bebryce cactus* new species. Holotype colony, USNM 93204.

mm tall overall, of which the tuberculate basal portion occupies roughly 0.09–0.1 mm. The projecting spine may have only a shallow apical bifurcation (Fig. 4b), or may be divided into several lacinated spines that occupy nearly half its length (Fig. 4c). In the commonest forms, however, the spine is doubly forked, with one or more of the divisions forked again.

The deeper layers of coenenchyme are filled with small 4- to 6-rayed platelets (Fig. 4d). The crosses reach about 0.3 mm in greatest diagonal, but the 5- and 6-rayed forms are somewhat smaller. These sclerites are very similar in size and shape to the predominant coenenchymal sclerites of *Bebryce crucifera* (Bayer).

Near the orifice of the calices the antler-like spiny rosettes diminish in size and, immediately around the calicular margin, they are only about 0.15 mm long, with a slightly bifurcate apex and four or five tuberculate basal processes (Fig. 4e).

The anthocodiae are fully retractile within the calices owing to an introvert devoid of sclerites. In some cases the distal part of the anthocodia with tentacles

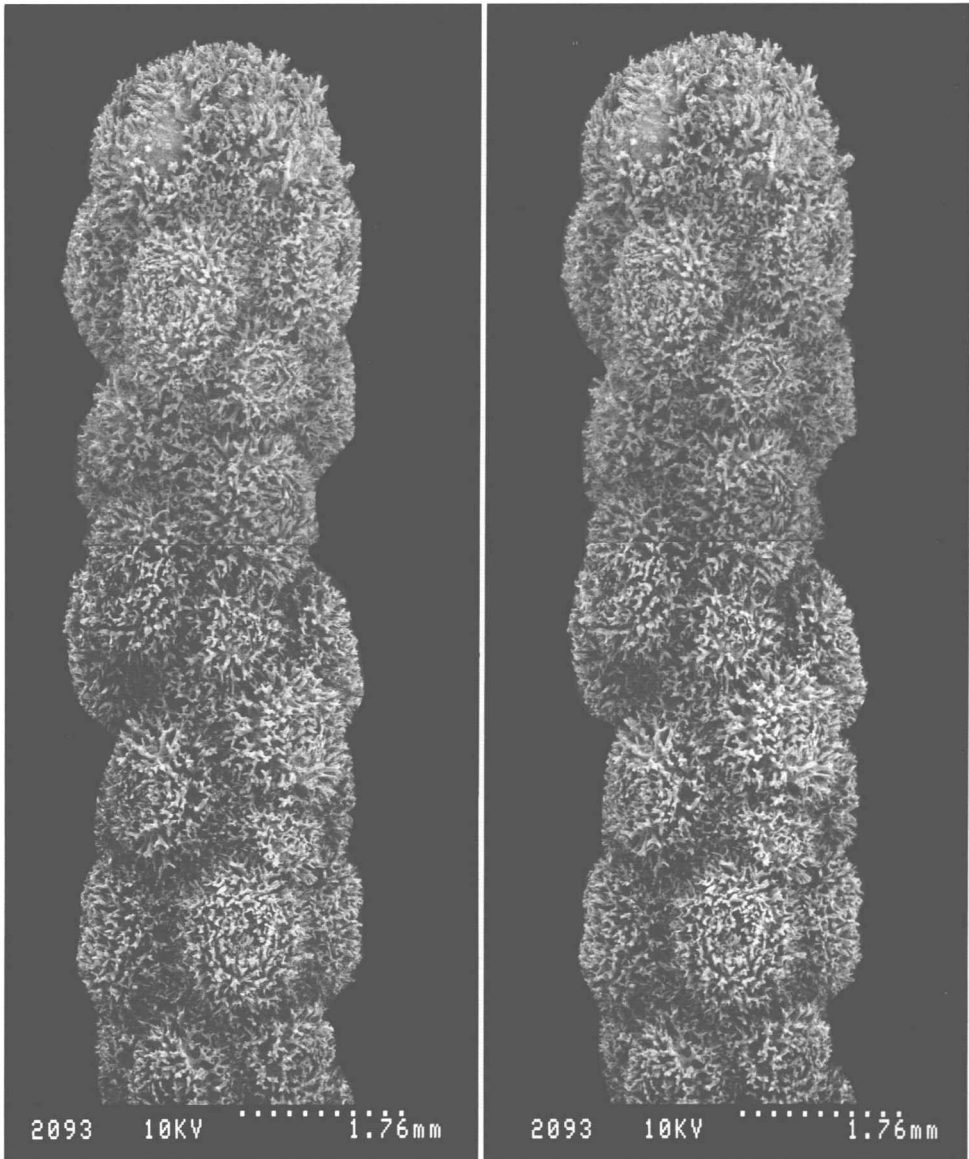


Figure 2. *Bebryce cactus* new species. Tip of terminal branchlet of holotype, USNM 93204. Stereoscopic SEM.

folded over the mouth may extend from the calicular aperture. A transverse collaret composed of four or five rows of bow-shaped spindles up to 0.45 mm long (Fig. 4f) encircles the anthocodiae below the tentacles; eight points composed of three or four pairs of slightly shorter bent spindles (Fig. 4g) *en chevron* are situated above the collaret just below the tentacles, followed by curved, flattened rodlets (Fig. 4h) about 0.2 mm long lying longitudinally along the backs of the tentacles.

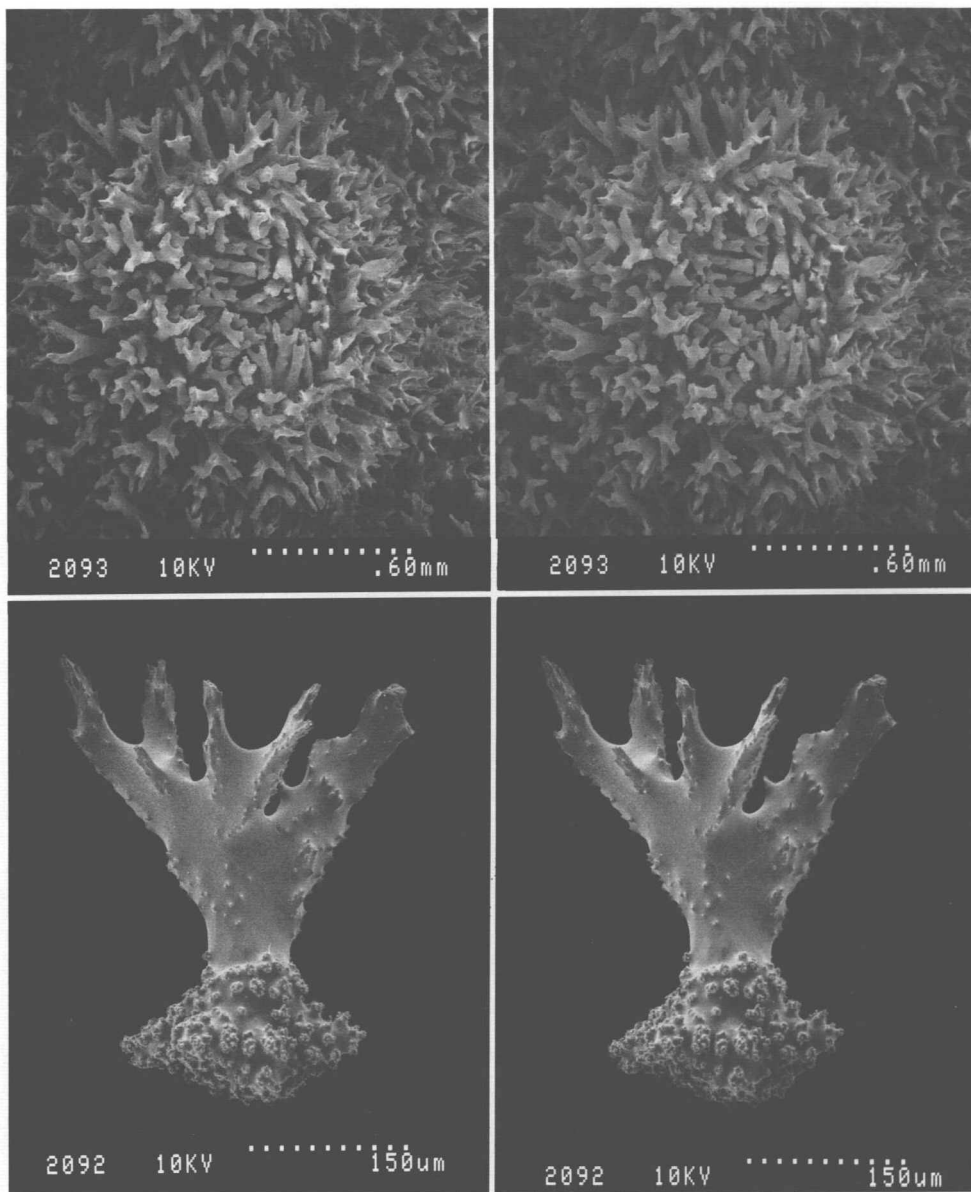


Figure 3. *Bebryce cactus* new species. Top, Single calyx of holotype, USNM 93204, oral view. Bottom, Antler-shaped spiny rosette. Stereoscopic SEM.

**Etymology.**—Latin *cactus*, from Greek *κακτος*, a prickly plant. Noun in apposition.

**Comparisons.**—The predominance of large, antler-like spiny rosettes in the outermost coenenchyme distinguishes this species from all species of *Bebryce* heretofore known. *Bebryce cactus* is one of a group of species characterized by numerous crosses and rosettes not of the cup-shaped type, including *B. indica* Thomson, *B. grandicalyx* (Kükenthal), and *B. crucifera* (Bayer).

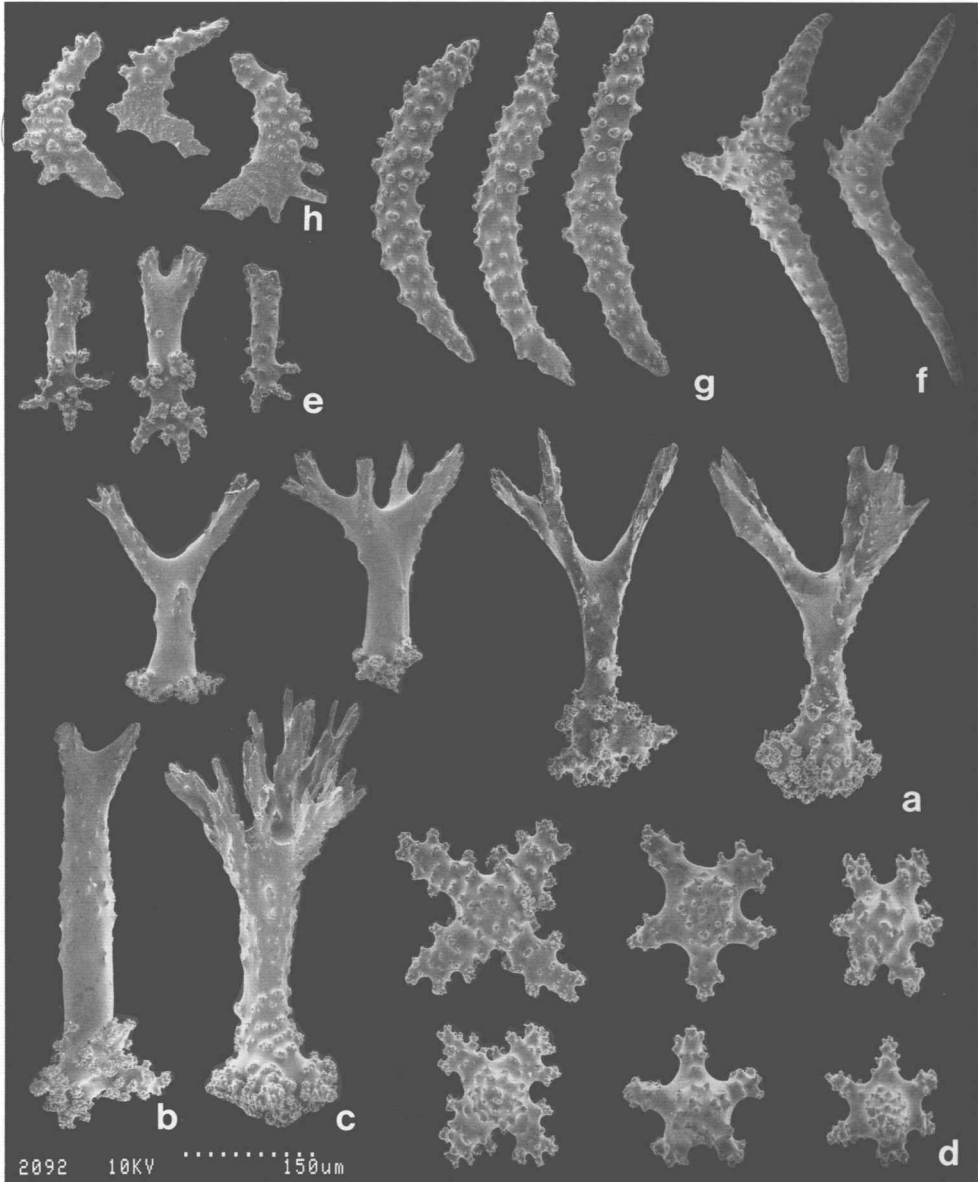


Figure 4. Sclerites of *Bebryce cactus* new species, holotype, USNM 93204. a, Antler-shaped spiny rosettes; b, c, Spiny rosettes with different apical spination; d, 4-, 5- and 6-rayed plates from inner coenenchyme; e, Spiny rosettes from calicular margin; f, Bow-shaped rods of anthocodial transverse crown; g, Curved rods from anthocodial points; h, Flattened rodlets from tentacles.

**Remarks.**—This species shows an extreme development of the spiny rosette sclerites of the outermost layer of coenenchyme characteristic of several species of *Bebryce*. In the type species, *B. mollis* Philippi, 1841, all rosettes are of the cup-shaped “collar-button” type. In *B. cactus*, the numerous fascicles of microcrystals forming the cup-shaped outer part are combined to form a bifid or antler-shaped projection. In other species the outer portion takes the shape of a more or less

prominent central boss that varies from low and rounded to rather tall and thorny. Only in *B. cactus* are the thorns so large and spine-like.

The antler-shaped sclerites of *B. cactus* are somewhat larger than, but morphologically identical to, the antler-shaped sclerites of *Lytreia plana* Deichmann (Deichmann, 1936) (Bayer 1981: 933, fig. 61), which occur patchily on the cortical surface of some but not all colonies; in some specimens the projecting process of the superficial sclerites is a simple spine, not forked, and in some the spinous sclerites are confined to the calicular margins, as in *Heterogorgia verrucosa* (Verrill, 1864) and *H. uatumani* Castro, 1990. More or less modified, spinous sclerites occur along the calicular margins in all species of *Bebryce* and even on the sides of the calices in some species. As the absence of spindles among the coenenchymal sclerites is the most conspicuous character distinguishing *Bebryce* Philippi from *Heterogorgia* Verrill and *Lytreia* Bayer, the genus-level status of the latter two is in need of reappraisal.

#### ACKNOWLEDGMENTS

It is a pleasure to express my appreciation to Dr. C. G. Messing for taking the time from his own project to collect the type specimens of *Bebryce cactus* as well as many other interesting specimens in a region where the Octocorallia are very poorly known. The manuscript was substantially improved by the helpful criticisms given by Dr. M. Grasshoff, for which I extend my best thanks. The scanning electron micrographs accompanying this paper were made with his usual skill by Mr. W. R. Brown, head of the SEM Laboratory, U.S. National Museum of Natural History. The plate of sclerites was assembled and lettered by Ms. M. Ryan, staff illustrator, Department of Invertebrate Zoology, U.S. National Museum of Natural History.

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